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(54) **Gas tap**

(57) A rotary frusto-conical gas tap comprises a housing formed with a gas inlet and a gas outlet, and a frusto-conical plug 14 which permits an increasing flow of gas through the housing from said inlet to said outlet as the plug is angularly turned progressively from an off position, the plug (14) being formed in its exterior surface with a plurality of elongated grooves (15, 16 and 17) and in its interior with a passage (18) connecting said outlet port, with grooves 15 and 16 via respective regulating holes (19 and 20), the third groove (17) communicating directly with said passage (18), each of said grooves (16, 17) beind displaced, relative to that groove which will have previously been in communication with the inlet port as the plug (14) is turned from its off position towards its fully on position, in a direction parallel to the rotational axis of the plug, and the leading end of each groove 16, 17, namely that end which will first communicate with said inlet port as the plug is turned from its off position towards its fully on position, overlapping the trailing end of that groove previously in communication with the inlet port.

FIG.2.

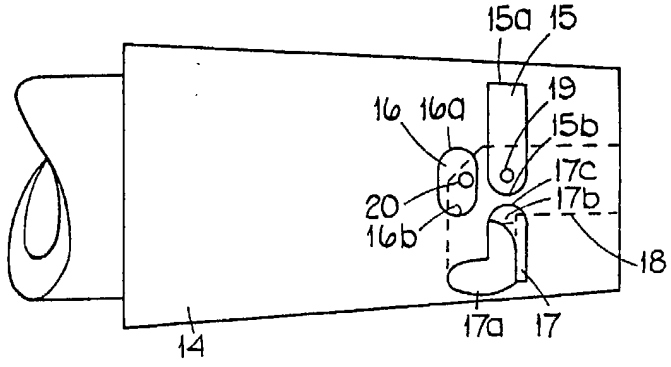

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FIG.1.

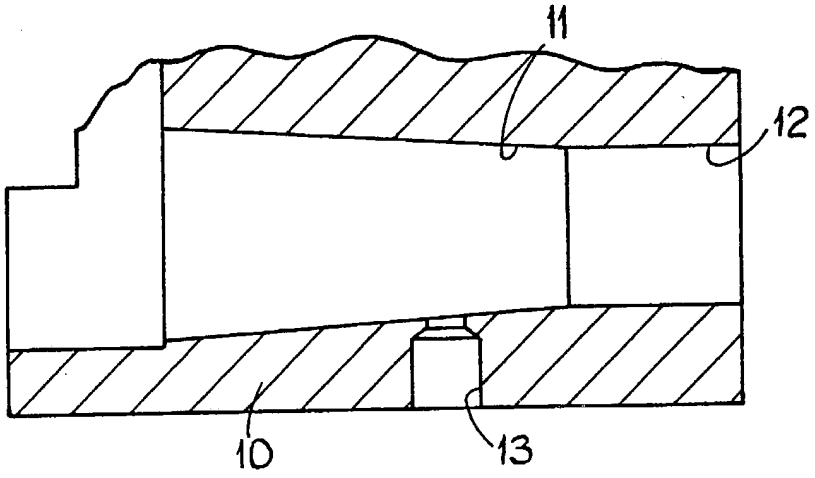


FIG.2.

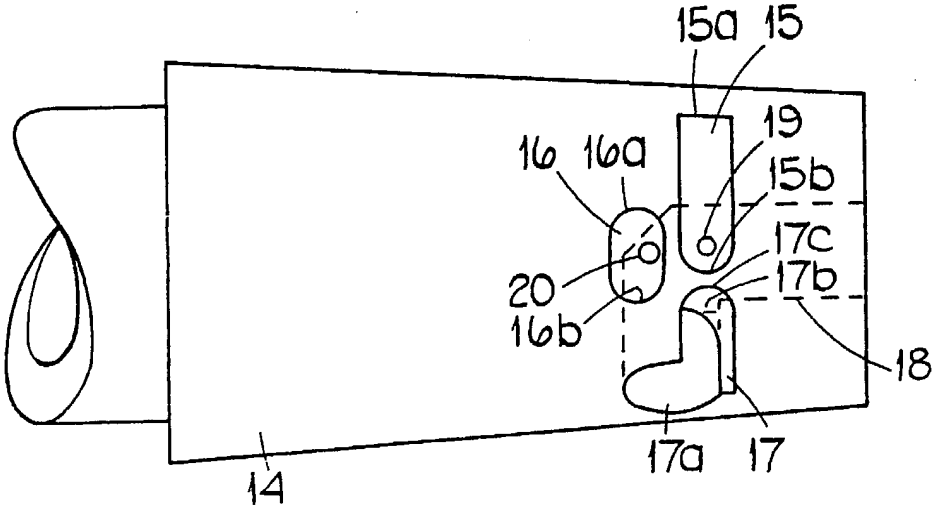
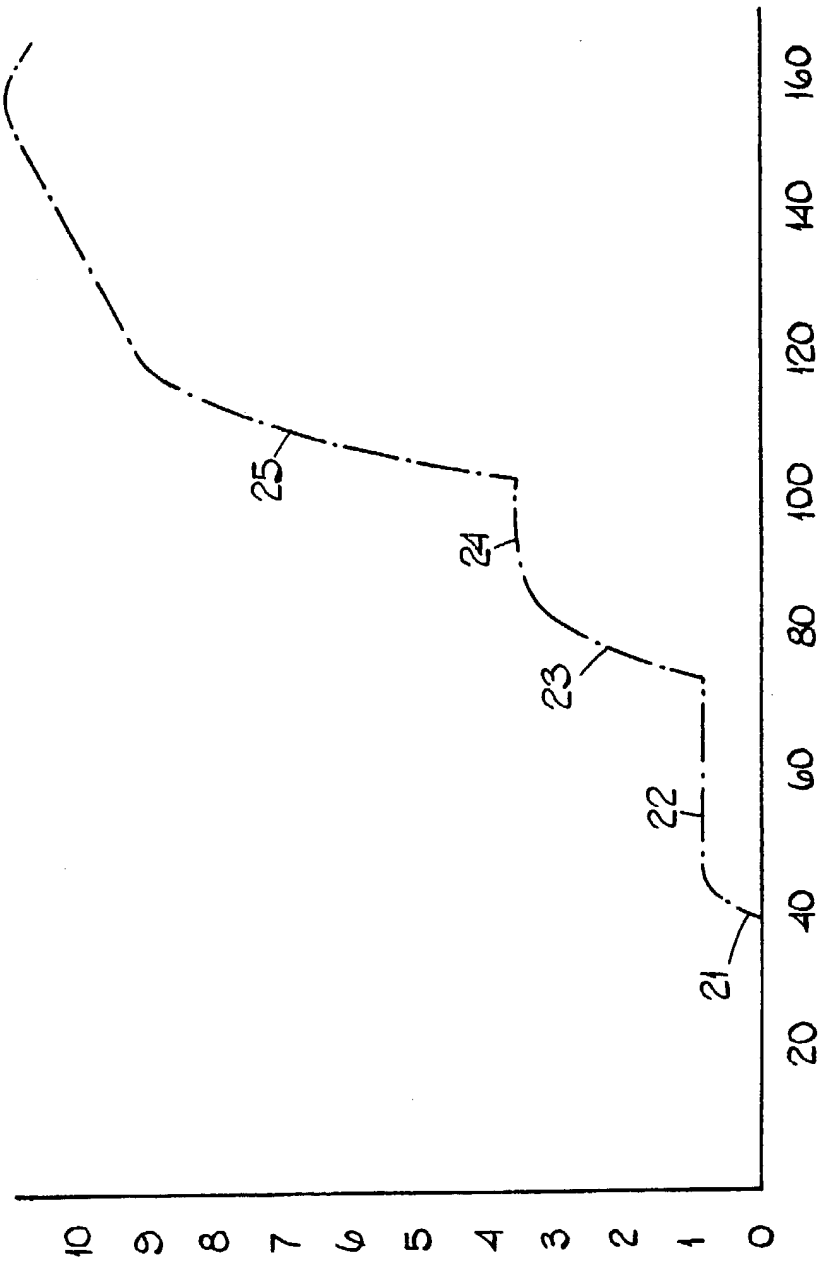


FIG.3.



SPECIFICATION

Gas tap

This invention relates to a gas tap which is intended for use in controlling the rate of flow of a combustible gas to a gas-burning appliance (such as, for example, a domestic cooker or a domestic fire), the gas tap being of the kind which comprises a housing formed with a frusto-conical recess in which is located an angularly movable frusto-conical plug, the housing having an inlet port which is connectible in use to a supply of gas and an outlet port which is connectible in use to a gas-burning appliance and the plug having passage means which are arranged, as the plug is progressively turned away from an off position in which there is no communication between said ports, to permit an increasing flow of gas to pass from said inlet port to the outlet port through said passage means.

With a gas tap of the above-described kind, it is desirable that the rate of flow of gas through the tap should be accurately controlled as the plug is turned progressively from the off position to the fully on position. It may also be required to provide, in the range of movement of the plug, that there shall be two discrete steps which each provide a constant or substantially constant rate of gas flow over a particular arc of movement of the plug, such steps being used for example to provide two simmer rates which could be used respectively for heating a small pan of milk and a large pan of milk.

The object of the present invention is to provide an improved gas tap which enables the above-mentioned desiderata to be achieved.

In accordance with the invention there is provided a gas tap of the kind specified wherein the plug is formed on its exterior with a plurality of elongated grooves which are adapted to communicate with said inlet port and which are arranged so that the longitudinal axis of each groove lies in a plane which is perpendicular or substantially perpendicular to the axis of said plug, each groove being displaced, in a direction parallel to said plug axis, in relation to that groove which will have previously been in communication with the inlet port as the plug is turned from its off position towards its fully on position, and the leading end of each groove, namely that end which will first communicate with said inlet port as the plug is turned from its off positon towards its fully on position, being arranged to overlap the trailing end of that groove which will have previously been in communication with the inlet port, the plug being also formed in its interior with a passage which communicates with said outlet port, and there being also provided two regulating holes which respectively connect said passage and two of said grooves, a third groove extending into the plug so as to communicate directly with said passage.

The invention will now be more particularly described with reference to the accompanying drawings wherein

Figure 1 is a fragmentary sectional elevation of a housing forming part of one example of a gas tap in accordance with the invention,

Figure 2 is an elevation of a plug which is intended for use with the housing shown in Figure 1, Figure 2 being drawn to a scale which is twice as large as that used for Figure 1, and

Figure 3 is a graph showing the relationship between the rate of gas flow (plotted on the vertical axis) and the angular degree of opening of the plug, plotted on the horizontal axis.

Referring now to the drawings Figure 1 shows the housing 10 of one example of a gas tap constructed in accordance with the invention. Said housing has a frusto-conical bore 11 which communicates at its smaller end with a cylindrical bore 12. The housing is also formed in one side with a port 13 which in use would be connected to a supply of gas so that said port 13 will act as an inlet port. The cylindrical bore 12 acts as an outlet port and would be connected in use to a gas-burning appliance such as for example a domestic cooker or a domestic fire.

Associated with said housing 10 is a plug 14 which is formed to a generally frusto-conical configuration corresponding to the frusto-conical bore 11 of the housing 10 so that said plug can be located in the bore 11 and be a good fit therein. There would also be provided a spindle which would project from the larger end of said plug, the spindle having at its outer end a knob whereby the plug 14 can be turned about its longitudinal axis in the bore 11. Conveniently said spindle would be arranged so that it has a limited degree of axial movement relative to the plug and would be spring loaded outwardly in the known manner to a position in which a detent is engaged so that the plug 14 cannot be turned unless a positive effort is made to push spindle inwardly, thereby preventing accidental turning on of the gas tap from the off position.

The exterior surface of said plug 14 is provided with a plurality of elongated grooves and in the example shown three such grooves are provided namely grooves 15, 16 and 17, the latter having a lateral axially directed, extension 17*a*. Groove 15, groove 16, and the part 17*b* of groove 17 are each arranged so that the longitudinal axis of the groove lies in a plane which is perpendicular to the longitudinal axis of the plug. Futhermore the three grooves 15, 16 and 17 are arranged to be brought successively into register with the inner end of the inlet port 13 as the plug 14 is rotated from its fully off position through a range of on positions to, eventually, the fully on position. In fact, in turning away from the fully off position towards the fully on position the first part of a groove which will be brought into register with the inlet port 13 is that part of the groove 15 which is adjacent to its leading edge 15*a*.

It will be noticed that each groove is displaced, in a direction parallel to the plug axis, in relation to that groove which will have previously been in communication with the inlet port as the plug is turned from its off position towards its fully on positon. Thus for example groove 16 is displaced axially to the left as compared with groove 15 and the part 17*b* of groove 17 is displaced axially to the right as compared with groove 16, as seen in Figure 2. Furthermore the leading end of each groove is arranged to overlap the trailing end of the preceding groove. Thus the

leading end 16*a* of groove 16 overlaps the trailing end 15*b* of groove 15. Also the leading end 17*c* of the groove 17 overlaps the trailng end 16*b* of groove 16.

The plug 14 is also formed in its interior with an axially extending passage 18, the outer end of which in use will open into said outlet port 12 of the housing, the inner end of said passage 18 being provided with a radially extending extension. In addition each of the grooves 15 and 16 is formed with a regulating hole 19 or 20 which extends through the base of the associated groove so as to communicate with said passage 18. The groove 17 is cut deeply enough into the plug so as to communicate directly with said radially extension of the passage 18. It is also to be understood that the inner end of the inlet port 13 has a diameter which is wide enough to be brought into register with at least a part of the combined widths of grooves 15 and 17 when for example the plug 14 is in a position in which the trailing end of groove 15 and the leading end of groove 16 are disposed in a position in which they are both aligned with said inlet port.

In use and considering the plug 14 to be initially disposed in its fully off position, an initial turning movement of the plug 14 about its longitudinal axis will first bring the leading end of the groove 15 into register with the inlet port 13 so that gas can flow from the inlet port into the groove 15 and can thence escape through the regulating hole 19, into the passage 18 and out through the outlet port 12 to the gas burning appliance. During this initial movement the rate of gas flow will increase as more of the groove 15 comes into register with the inlet port 13 and this initial phase is illustrated in the portion of the graph shown in Figure 3 indicated by reference numeral 21. After said groove 15 has been fully exposed the rate of gas flow, being fully regulated by regulating hole 19 remains constant through an arc of movement of the plug which is defined between a position in which the plug has turned through approximately 45° from the initial fully off position and a position in which the plug has turned through an arc of approximately 75°. This stage of constant rate of gas flow is indicated by reference numeral 22 in Figure 3. The leading end of groove 16 then comes into communication with a part of the inner end of the inlet port 13 so that the rate of gas flow now increases as indicated by the part 23 of the graph in Figure 3, gas now being also able to flow to the outlet port via the regulating hole 20 and passage 18. Thus when the groove 16 comes fully into use a substantially second constant gas flow rate is achieved over a small arc movement of the plug as indicated by reference numeral 24 in Figure 3. Finally the leading end of part 17*b* of groove 17 comes into alignment with the inlet port 13 and gas can now commence to flow at a still greater rate by passing directly from said groove 17 into the passage 18 and this part of the graph in Figure 3 is indicated by reference numeral 25 which provides for a continuing increase in the rate of flow until the fully on position is reached. The above described arrangement will thus provide for two positions in the range of movement of the plug which will provide respectively two constant flow rates over an arc of movement of the plug but at the same time the aforementioned overlapping of the leading end of one groove with the trailing end of the preceding groove will ensure that a continuity of gas flow is maintained throughout the whole range of movement of the plug.

CLAIMS

1. A gas tap of the kind specified wherein the plug is formed on its exterior with a plurality of elongated grooves which are adapted to communicate with said inlet port and which are arranged so that the longitudinal axis of each groove lies in a plane which is perpendicular or substantially perpendicular to the axis of said plug, each groove being displaced, in a direction parallel to said plug axis, in relation to that groove which will have previously been in communication with the inlet port as the plug is turned from its off position towards its fully on position, and the leading end of each groove, namely that end which will first communicate with said inlet port as the plug is turned from its off position towards its fully on position, being arranged to overlap the trailing end of that groove which will have previously been in communication with the inlet port, the plug being also formed in its interior with a passage which communicates with said outlet port, and there being also provided two regulating holes which respectively connect said passage and two of said grooves, a third groove extending into the plug so as to communicate directly with said passage.

2. A gas tap as claimed in Claim 1 wherein said third groove has a lateral, axially extending, extension.

3. A gas tap of the kind specified substantially as hereinbefore described with reference to and as shown in the accompanying drawing.

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member and the flow restrictor member and wherein movement of the flow restrictor member in the opening direction is delayed by a hydraulic delay member.

7. A valve according to claim 5, wherein the two magnetic systems are connected to each other and wherein the valve closure member and the flow restrictor member are connected to each other by a hydraulic delay member during the movement in the opening direction.

8. A valve according to any one of claims 3 to 7, wherein the operative position of the flow restrictor member is determined by an adjustable stop.

9. A valve according to claims 4 and 8, wherein the stop is provided on the side of the flow restrictor member remote from the central pin.

10. A valve according to claim 4, wherein a first magnetic system for the valve closure member comprises a perforated armature through which is guided the central pin, and wherein a second magnetic system for the flow restrictor member is located on the side of the first magnetic system remote from the valve closure member.

11. A valve according to claim 10, wherein the central pin is guided in the perforated armature in a sealed manner.

12. A valve according to any one of claims 6 to 11, wherein the delay member, comprising a large time constant in the opening direction and a very small time constant in the closing direction, is incorporated between the armature for the flow restrictor member and the central pin.

13. A valve according to any one of claims 6 to 11, wherein the delay member delays the attraction movement of the armature of the magnetic system actuating the flow restrictor member.

14. A valve according to any one of claims 4 to 13, wherein a stop is provided for the central pin, which stop is adjustable from the outside and is preferably constructed in the form of a set-screw in axial alignment with the pin.

15. A fluid control valve substantially as herein described with reference to and as illustrated in the accompanying drawing.

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1427360 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*